

## Elizabeth A. Burakowski

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### EDUCATION

- 2013 Ph.D. Earth and Environmental Sciences, Natural Resources and Earth System Sciences (NRESS) Interdisciplinary Program, University of New Hampshire (UNH), Durham, NH.  
*Dissertation: Winter Climate Impacts of Historical Deforestation in New England*
- 2007 M.S. Earth Science-Geochemical Systems, Dept. of Earth Sciences, UNH, Durham, NH.  
*Thesis: Trends in Wintertime Climate Variability in the Northeastern United States*
- 2003 B.A. Geology, Wellesley College, Wellesley, MA

### RESEARCH INTERESTS

My research investigates the interactions among land cover, land use and surface climate. Specifically, I use remote sensing, observations, and climate models to evaluate how changes in vegetation impact the surface exchange of energy and water. I am very interested in how human activities have affected and will continue to affect winter climate. My research on winter climate incorporates citizen science snow sampling and engagement with stakeholders in the winter tourism industry.

### PROFESSIONAL APPOINTMENTS

- 2016-present Research Assistant Professor, UNH, Durham, NH  
2015-2016 Postdoctoral Research Associate, UNH, Durham, NH  
2015-2016 Visiting Scientist, NCAR, Boulder, CO  
2014-2015 Postdoctoral Researcher, NCAR, Boulder, CO

### RESEARCH EXPERIENCE

- 2011-2013 Research Assistant, Earth Systems Research Center, UNH, Durham, NH  
2010-2011 NASA Space Grant Fellow, UNH, Durham, NH  
2009-2010 NRESS Fellow, UNH, Durham, NH  
2005-2007 Research Assistant, Earth Systems Research Center, UNH, Durham, NH

### TEACHING EXPERIENCE

- 2018 *Global Environmental Change*, Dept. of Earth Sciences, UNH, Durham, NH. 4 cr.  
2017 *Introduction to Climate*, Dept. of Earth Sciences, UNH, Durham, NH. 3 cr.  
2017 *Paleoclimatology*, Dept. of Earth Sciences, UNH, Durham, NH. 3 cr + writing intensive.

**PEER-REVIEWED PUBLICATIONS**

Articles submitted or in-prep:

**Burakowski, EA**, A Tawfik, A Ouimette, L Lepine, C Zarzycki, K Novick, SV Ollinger, and GB Bonan. Simulating surface energy fluxes using uncoupled and coupled Earth System Models and eddy covariance tower clusters. in review at *Theoretical and Applied Climatology*. in revision.

Published articles:

- [12] Levy\*, Charlotte, **EA Burakowski**, and A Richardson. Small-scale albedo measurements: A UAV approach. *Remote Sensing*, 10(8): 1303. doi: 10.3390/rs10081303.
- [11] Bonan, GB, EG Patton, IN Harman, KW Oleson, JJ Finnigan, Y Lu, and **EA Burakowski**. 2018. Modeling canopy-induced turbulence in the Earth system: a unified parameterization of turbulent exchange within plant canopies and the roughness sublayer (CLM-ml v0). *Geoscientific Model Development-Discussions*, 11(4): 1467-1496.
- [10] **Burakowski, EA**, A Tawfik, A Ouimette, L Lepine, K Novick, SV Ollinger, C Zarzycki, and GB Bonan. The role of surface roughness, albedo, and Bowen ratio on ecosystem energy balance in the Eastern United States. *Agricultural and Forest Meteorology: Ameriflux 20<sup>th</sup> Anniversary Special Issue*, 249: 367-376. doi: 10.1016/j.agrformet.2017.11.030
- [9] \*Amaral, T, CP Wake, JE Dobb, **EA Burakowski**, and M Stampone. A simple model for predicting snow albedo decay using snow observations from the Community Collaborative, Rain, Albedo, Hail, and Snow (CoCoRAHS-Albedo) Network. *Journal of Glaciology*, 63(241): 877-887. doi: 10.1017/jog.2017.54.
- [8] Contosta, A, A Adolph, D Burchsted, **EA Burakowski**, M Green, D Guerra, M Albert, J Dobb, M Martin, W McDowell, M Routhier, CP Wake, R Whitaker, and W Wollheim. 2017. A longer vernal window: the role of winter coldness and snowpack in driving spring thresholds and lags. *Global Change Biology*, 23: 1610-1625. doi: 10.1111/gcb.13517.
- [7] Contosta, A, **EA Burakowski**, R Varner, S Frey. Winter soil respiration in a humid temperate forest: The roles of moisture, temperature, and snowpack. *Journal of Geophysical Research Biogeosciences*, 121: 3072-3088. doi: 10.1002/2016JG003450.
- [6] **Burakowski, EA**, S Ollinger, DY Hollinger, CP Wake, JE Dobb and GB Bonan. 2016. Evaluating the climate effects reforestation in New England, USA, using a Weather Research and Forecasting (WRF) model multi-physics ensemble. *Journal of Climate* 29: 5141:5156. [Media: NBCLearn](#).
- [5] Lutz, DA, **EA Burakowski**, MB Murphy, ME Borsuk, RM Niemiec, and RB Howarth. 2016. Tradeoffs between three forest ecosystem services across the state of New Hampshire, USA: Timber, Carbon, and Albedo. *Ecological Applications* 26(1): 146-161.

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\* Student author

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- [4] **Burakowski, EA**, S Ollinger, L Lepine, CB Schaaf, Z Wang, JE Dibb, DY Hollinger, J-H Kim, A Erb, and ME Martin. 2015. Spatial scaling of reflectance and surface albedo over a mixed-use, temperate forest landscape during snow-covered periods. *Remote Sensing of Environment* 158: 465-477.
- [3] Hanson, E, and **EA Burakowski**. 2015. Sampling in the Snow: Winter Field Experiences Provide Relevant, Real World Connections Between Scientific Practice and Disciplinary Core Ideas. *The Science Teacher* 82(3): 36-41.
- [2] **Burakowski, EA**, CP Wake, M Stampone, J Dibb. 2013. Putting the Capital 'A' in CoCoRAHS: An Experimental Program to Measure Albedo using the Community Collaborative Rain Hail and Snow (CoCoRaHS) Network. *Hydrological Processes* 27(21): 3024-3034.
- [1] **Burakowski, EA**, CP Wake, B Braswell, and DP Brown, 2008. Trends In Wintertime Climate In The Northeastern United States: 1965-2005. *Journal of Geophysical Research-Atmospheres*. [Media, Boston Globe](#).

### REPORTS AND OTHER PUBLICATIONS

- Hagenstad, M, **EA Burakowski**, and R. Hill. 2018. Economic contributions of the winter sports industry in a changing climate. Protect Our Winters, Boulder, CO. <https://scholars.unh.edu/cgi/viewcontent.cgi?article=1190&context=ersc>
- Burakowski, EA**. 2015. If you like skiing or snowboarding, you should care about climate change. [The Guardian](#), 16-February-2015.
- Wake, CP, **EA Burakowski**, P Wilkinson, K Hayhoe, A Stoner, C Keeley, and J LaBranche. 2014. Climate Change in Southern New Hampshire: Past, Present, and Future. Climate Solutions New England, Durham, NH. June 2014.
- Wake, CP, **EA Burakowski**, P Wilkinson, K Hayhoe, A Stoner, C Keeley, and J LaBranche. 2014. Climate Change in Northern New Hampshire: Past, Present, and Future. Climate Solutions New England, Durham, NH. June 2014.
- Burakowski, EA**, M Magnusson. 2012. Climate Impacts on the US Winter Tourism Economy. Natural Resources Defense Council and Protect Our Winters, Washington, DC. December 2012. [Media, New York Times](#).
- Wake, CP, **EA Burakowski**, K Hayhoe, A Stoner, C Watson, E Douglas. 2011. Climate Change in the Piscataqua/Great Bay Region: Past, Present, and Future. Climate Solutions New England, Durham, NH. December, 2011.
- Wake, CP, **EA Burakowski**, K Hayhoe, C Watson, E Douglas, J VanDorn, V Naik, and C Keating. 2009. Climate Change in the Casco Bay Watershed: Past, Present, and Future, Casco Bay Estuary Partnership Report, University of Southern Maine, Portland, December 2009.
- Wake, CP, **EA Burakowski**, and L Goss. 2006. Winter Recreation and Climate Variability in New Hampshire: 1984-2006. Carbon Coalition & Clean Air – Cool Planet Report. October, 2006.

### GRANTS AND FELLOWSHIPS

- 2018-2020 NSF-EPSCoR RII Track 4 Fellowship: Next Generation Climate Modeling of Winter Climate in the United States. \$147,292. Sole PI.

## Elizabeth A. Burakowski

- 2018-2020 NSF-MSB-ECA: A Lengthening Vernal Window: How Vernal Asynchronies in Energy, Water, and Carbon Fluxes Impact Ecosystem Function. \$298,597. Lead PI.
- 2018-2019 US Forest Service CitSci Fund: Tracking the Vernal Window with a Low-Cost Instrumentation Suite. \$24,646. Lead PI.
- 2018 Iola Hubbard Endowment: Winter Weather Whiplash Indicators. \$15,200. Co-PI.
- 2018 Iola Hubbard Endowment: Ozone Garden to support the NASA TEMPO mission at the Children's Museum of NH. \$4,520. Lead PI.
- 2017-2019 NASA: Global Learning and Observations to Benefit the Environment Student Research Symposium. \$437,596. Co-PI.
- 2017-2018 NH Department of Education: Building Vertical Science Literacy Through Teacher Leaders. \$74,273. Co-PI.
- 2014-2016 NH Department of Education: Building Vertical Science Literacy through Environmental Themes and Field Investigations. \$325,000. Co-PI.

### INVITED SEMINARS AND PRESENTATIONS

- 2018 *Climate Change and the Ski Industry*. Mount Washington Observatory, North Conway, NH. 9-July-2018.
- 2018 *Impacts of Forest Cover on Surface Climate: A New England Case Study*. Bennington College, Bennington, VT. 30-March-2018
- 2018 *Climate Change and the Ski Industry*. Bennington College, Bennington, VT. 29-March-2018.
- 2018 *Climate Change in Maine: Past, Present, and Future*. Climate Adaptation Planning for Coastal Communities. Casco Bay Estuary Partnership and NOAA. Brunswick, ME. 20-March-2018.
- 2017 *Connecting Culture and Science to Understand Climate Change*. Panelist. University of New Hampshire, Durham, NH. 30-Nov-2017.
- 2017 *Impacts of Forest Cover on Surface Climate: A New England Case Study*. Boston University Biogeosciences Seminar, Boston, MA. 18-September-2017.
- 2017 *Our changing winter climate*. Granite Backcountry Alliance Wild Corn Festival. Cranmore Mountain, North Conway, NH. 1-April-2017.
- 2016 *Climate Science: How's Earth Doing?* Protect Our Winters Athlete Summit. Squaw Valley, CA. 13-Dec-2016.
- 2016 *Surface Climate Impacts of Forest Cover in New England*. UNH Fall Environmental Sciences Seminar. UNH, Durham, NH. 30-September-2016.
- 2016 *Forests, Fields, Farms and Climate*. Biogeochemistry, Environmental Science and Sustainability Seminar. Cornell University, Ithaca, NY. 9-September-2016.
- 2016 *The Climate and Forest History of New England*. Mount Washington Observatory Weather Discovery Center, North Conway, NH. 17-August-2016.
- 2016 *The Climate Legacy of Forests: A New England Case Study*. Boise State University, Boise, ID. 08-July-2016.

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- 2015 *I Am Pro Snow: The Winter Sports Industry, Mountain Communities, And The Future Of Snow*, Panelist. World Climate Summit, 21<sup>st</sup> Session of the Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC). Paris, France. 06-Dec-2015.
- 2015 *Climate impacts of historical deforestation in New England, USA using a WRF multi-physics ensemble*, Harvard Forest Seminar, Petersham, MA. 20-March-2015.
- 2015 *Climate Impacts of historical deforestation in New England, USA using a WRF multi-physics ensemble*, NCAR Climate and Global Dynamics Seminar, Boulder, CO. 24-Feb-2015
- 2015 *Scientific Advances in Wintertime Predictability*, SnowSports Industries of America (SIA) International Research Forum, SIA Snow Show, Denver, CO. 30-January-2015.
- 2014 *4<sup>th</sup> Annual Women in Science and Technology Forum*, Panelist. White Mountains Community College, Berlin, NH. 04-April-2014.
- 2014 *Climate Change and the Ski Industry*. Vermont Law School Climate Change Symposium: Brown Slopes, Bare Trails. Royalton, VT. 06-Feb-2014.
- 2013 *Putting the Capital 'A' in CoCoRaHS: A volunteer network of snow albedo observers in the Granite State*. Plymouth State University Fall Environmental Sciences Colloquium, Plymouth, NH. 25-Sept-2013.
- 2013 *Climate Impacts on the Winter Tourism Economy in the United States*. SnowSports Industries of America International Research Forum, Denver, CO. 31 Jan- 3 Feb 2013.

### SELECTED CONFERENCE AND WORKSHOP PRESENTATIONS

- 2018 *Remote Sensing and modeling of snow and vegetation*. Arctic Science and Integration Quest 2, Tokyo, Japan. 2018-10-30.
- 2018 *A Lengthening Vernal Window: How Vernal Asynchronies in Energy, Water, and Carbon Fluxes Impact Ecosystem Function*, NRESS Fall Seminar Series, University of New Hampshire, Durham, NH. 2018-09-12.
- 2018 *Climate Change and the Ski Industry*. New England Summit, Sunday River, Newry, Maine. 2018-09-11.
- 2018 *Economic Contributions Of Winter Sports In A Changing Climate*, MtnClim, Rocky Mountain Biological Lab, Gothic, CO. Poster and Workshop. 18-Sept-2018.
- 2018 *Climate Change and the Ski Industry*, TEDx Belmont, Blemon, NH. 26-May-2018.
- 2018 *New England Climate, Forests, and Farms*. Upper Valley Adaptation Workgroup (UVAW). Dartmouth Hitchcock Center, Lebanon, NH. 15-May-2018.
- 2018 *Contrasting Effects of a Warm Winter on Carbon Fluxes Across Land Cover Types in NH, USA*. Oral presentation. Lamprey River Symposium, Durham, NH. 08-Jan-2018. Presenting author.
- 2016 *Does surface roughness dominate biophysical forcing of land use and land cover change in the eastern United States?* Oral presentation. Fall Meeting of the American Geophysical Union. San Francisco, CA, 15-Dec-2016.

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- 2016 Evaluating Biophysical Impacts of Land Cover in CLM4.5 and VR-CESM1.3 with Ameriflux Tower Clusters. Oral Presentation. 21<sup>st</sup> Annual Community Earth System Model Workshop, Land Model Working Group. Breckenridge, CO. 20-23 June 2016.
- 2015 Using Eddy Covariance Tower Clusters to Evaluate Biophysical Impacts of Land Cover In The Community Land Model (CLM4.5). Oral Presentation. Fall Meeting of the American Geophysical Union. San Francisco, CA, 16-Dec-2015. Session B34A-04, Abstract #78558.
- 2015 Evaluation of winter and summer climate responses to mid-1800s deforestation in New England using a regional climate model. Poster Presentation. 2015 Long Term Ecological Research Network All Scientists Meeting, Estes Park, CO, 01-Sept-2015.
- 2015 *Land Surface Modeling of a Flux Tower Cluster in the Northeastern US with CLM4.5*. Oral Presentation. 20<sup>th</sup> Annual Community Earth System Model Workshop, Breckenridge, CO. 15-18 June 2015.
- 2014 *The Costs of Climate Change: Impact of Future Snow Cover Projections on Valuation of Albedo in Forest Management*. Poster Presentation. Fall Meeting of the American Geophysical Union. San Francisco, CA, 15-Dec-2014. Session GC11E-0611, Abstract #30022.
- 2014 *Sampling in the Snow: High School Winter Field Experiences Provide Relevant, Real World Connections Between Scientific Practices and Disciplinary Core Ideas*. Poster Presentation. Fall Meeting of the American Geophysical Union, San Francisco, CA, 19-Dec-2014. Session ED51B-3436, Abstract #30452.
- 2014 *An extreme-ensemble approach for evaluating regional responses to land cover change in the Northeastern US using WRF*. Poster Presentation. 15<sup>th</sup> Annual Weather, Research, and Forecasting Model User's Workshop, Boulder, CO. 23-25 June 2014.
- 2013 *Spectral Reflectance and Albedo of Snow-Covered Heterogeneous Landscapes in New Hampshire, USA: Comparison of Ground-based, Airborne Hyperspectral, and MODIS Satellite Data*. Poster Presentation. Fall Meeting of the American Geophysical Union, San Francisco, CA, 10-Dec-2013.
- 2013 *Evaluating the Quality of "Citizen Scientist" Snow Albedo Observations for use in Climate System Studies*. Oral Presentation. 93<sup>rd</sup> Annual Meeting of the American Meteorological Society, Austin, TX, 6-10 January 2013.
- 2012 *Climate Impacts of Mid-1800's Deforestation in New England using the Weather, Research, and Forecasting (WRF) Model*. Oral Presentation. Session A32E: Regional Climate Modeling, Fall Meeting of the American Geophysical Union, San Francisco, 5-Dec-2012.
- 2012 *Putting the Capital 'A' in CoCoRAHS: A Pilot Program to Measure Albedo using the Community Collaborative Rain Hail and Snow (CoCoRaHS) Network*. Oral Presentation. Session ED13E: Public Participation in Citizen Science Research I, Fall Meeting of the American Geophysical Union, San Francisco, 3-Dec-2012.

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- 2012 *Putting the Capital 'A' in CoCoRAHS: An Experimental Program to Measure Albedo using the Community Collaborative Rain Hail and Snow (CoCoRaHS) Network.* Oral Presentation. 69<sup>th</sup> Annual Eastern Snow Conference, Claryville, NY. 5-7 June 2012. [**\*\*Awarded Wiesnet Medal for Best Student Paper Overall**].
- 2012 *Climate Change in the Casco Bay and Great Bay Watersheds: Past, Present, and Future.* Poster Presentation. 92<sup>nd</sup> Annual Meeting of the American Meteorological Society, New Orleans, LA. 21-26 January 2012.
- 2011 *The Impacts of Colonial-Era Deforestation on Wintertime Albedo and Climate.* Poster Presentation. 22<sup>nd</sup> National NSF Experimental Program to Stimulate Competitive Research (EPSCoR) Conference. Couer d'Alene, Idaho. 24-27 October 2011. [**\*\*Awarded 2<sup>nd</sup> Prize in Student Poster Competition: Water/Environment Category**].
- 2010 *The Impacts of Reforestation on Winter Surface Albedo in the Northeastern United States.* Poster Presentation. Fall Meeting of the American Geophysical Union, San Francisco, 13-Dec-2010.
- 2007 *Trends In Wintertime Climate Variability In The Northeastern United States: 1965-2005.* Fall Meeting of the American Geophysical Union. Poster presentation. San Francisco, CA, 11-Dec-2007.

### AWARDS & RECOGNITION

- 2012 Wiesnet Medal for Best Student Paper, Eastern Snow Conference, Claryville, NY. 5-7 June 2012
- 2011 2<sup>nd</sup> Prize Student Poster Competition: Water & Environment, National NSF EPSCoR Conference, Coeur d'Alene, ID. 24-27 October 2012
- 2011 Alexander Goetz Instrument Support Program Recipient
- 2007 UNH College of Engineering and Physical Sciences Teaching Assistant Award

### PROFESSIONAL TRAINING

- Flux Course, University of Colorado Mountain Research Station, near Boulder, Colorado, USA. July 11-22, 2016.
- Teaching Institute for Graduate Education Research Summer Teaching as Research Institute for Post-docs in Engineering Workshop. Center for the Integration of Research, Teaching, and Learning, University of Colorado, Boulder. June 13-17, 2016.
- Global Learning and Observation to Benefit the Environment (GLOBE) Partner and Diversity Training Workshop (Boot Camp). Santa Fe, New Mexico. May 22-27, 2016.
- WRF Regional Climate Modeling Tutorial, Boulder, CO. July 30, 2014.
- Community Land Model (CLM) Tutorial. NCAR, Boulder, CO. February 18-21, 2014.
- National Center for Atmospheric Research Command Language (NCL) Tutorial. NCAR, Boulder, CO. January 14-17, 2014.
- Analytical Spectral Devices Remote Sensing Training Workshop. Boulder, CO. June 14-15, 2012.

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Gravitec Systems, Inc. Tower Climber & Rescue Competent Person Course. US Forest Service Northern Research Station, Durham, NH. November 3-4, 2011.

WRF Winter Tutorial. NCAR, Boulder, CO. January 25-29, 2010.

### **PROFESSIONAL ORGANIZATIONS AND SERVICE**

- American Meteorological Society, 2007-present
- American Geophysical Union, 2007-present
- Journal Article Reviewer: *Biogeosciences*, *Climatic Change*, *Global Environmental Change*, *Hydrological Processes*, *Journal of Climate*, *Journal of Geophysical Research-Atmospheres*, *Journal of Geophysical Research-Biogeosciences*, *Journal of Applied Meteorology and Climatology*, *Nature Climate Change*, *Remote Sensing of Environment*, *Remote Sensing*
- Panel Reviewer: NASA, NSF

### **MEDIA COVERAGE**

*New York Times*, *Boston Globe*, *The Guardian*, PBS News Hour, The Weather Channel, Discovery Channel

### **RESEARCH SKILLS**

Matlab, NCAR Command Language (NCL), ENVI, Fortran, GIS, Weather Research and Forecasting (WRF) Model, Community Land Model (CLM), and Community Earth System Model (CESM)